# Home Electricity Audit

*by Leif Albertson*

**EEM-00254**

**Perhaps the most important advancement in residential lighting in recent years has been the wide-scale adoption of the compact fluorescent bulb.**

Electricity is vital to the health, safety, productivity and quality of life of the modern Alaska family. It's an amazingly versatile energy source that can be used for heat, light, powering appliances and even playing video games. For many of us, it's easy to take electricity for granted in our modern life. Consequently, many families may be using more electricity than necessary.

A home electricity audit is a systematic survey of the home that can be performed by anyone. It can cut electric bills, empower families to cope with fluctuating energy prices and reduce the environmental impact of electricity production. Many learn that it is easy to reduce their electrical use without impacting their daily lives. This publication will help you look at some of the most important ways you can conserve electricity and lower electric bills.

## Lighting

One of the most obvious uses of electrical power in the home is lighting. American homes devote about 9 percent of their electrical budget to lighting.[1] The simplest way to save on lighting costs is, unsurprisingly, to be vigilant about turning out lights when they are not being used. This works best when the whole family is on board. "Last out? Lights off!" Some homeowners, especially those with large families or children, have taken the additional step of putting timers or motion sensors on some of the lights in their home. These devices are available from home improvement stores and can easily be ordered online. Porch lights are a great place to put a motion detector. Motion detectors can help provide the light you need for safety and convenience while conserving electricity.

When looking at different parts of your home, consider how much light you need for different activities. Perhaps fewer bulbs or less intense bulbs could be used in some areas and bright, energy-intensive bulbs could be used for areas requiring more light, such as sewing tables and workshops. Consider supplemental lighting for specific tasks.

Also, don't forget about making the most of natural lighting. Surprisingly, windows are often overlooked as a lighting source.

Many homes in Alaska have switched to compact fluorescent light bulbs (CFLs). If you haven't made the switch, it's probably time to do it.

Compact flourescent lightbulbs are widely available and use about 75 percent less energy than a traditional incandescent bulb. They also last at least six time longer than traditional bulbs. Compact fluorescent bulbs have been around for many years, but they continue to improve. Early models had problems such as large size, unpleasant light quality and a delayed "warm-up" time, but these issues have been mostly resolved in recent years. Additionally, the price of CFLs has dropped dramatically. Compact fluorescent bulbs are perfect for most uses in the home, but CFL performance suffers at very cold air temperatures. Also, fluorescent bulbs contain a

very small amount of mercury, so be sure to follow the manufacturer's recommendations for disposal of bulbs.

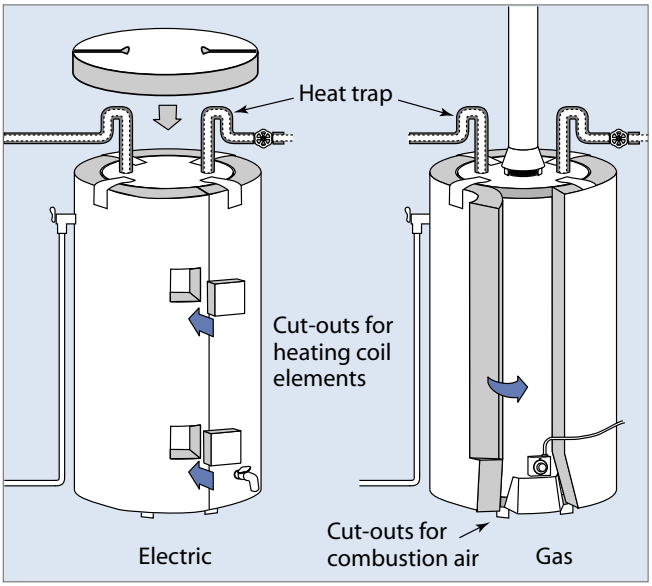
On the horizon, new residential lighting technologies such as LED light bulbs have been gaining some acceptance. Currently, it is not clear that LEDs are a cost-effective option for most homeowners, but as the technology becomes cheaper, they will become a more attractive option and will further reduce the electricity needed to keep our homes comfortable and well lit.

## Hot Water Heater

Electric hot water heaters turn electricity into heat by running an electrical current through a large, resistive heating element. This element heats the water inside an insulated tank. Voilà, hot water on tap! In general, electric heating appliances are extremely power-hungry devices and, it turns out, electric hot water heaters account for about 14 to 25 percent of a home's energy use.[2] Hot water is important for comfort and health, but there are things we can do to reduce the amount of electricity we use to heat water.

One of the simplest steps is to check the thermostat on your electric water heater. Residential water heaters usually have an easily accessible thermostat. Turning down the temperature of the hot water heater reduces the amount of electricity needed. In fact, according to the U.S. Department of Energy (www.energysavers.gov), with a 10°F reduction in water temperature you can save between 3 and 5 percent in energy costs. You may need to experiment with your water heater to find the temperature that works best for you. Try starting at a setting of 120°F. If you find yourself running out of hot water, turn it up a bit.

Some people save electricity by putting their electric hot water heater on a timer. In many homes, hot water usage is fairly predictable. Often, little hot water is needed during the middle of the day or the middle of the night. An outlet timer will run your water heater only when needed. You may need to experiment a bit to get this right. Remember, it can take over an hour to heat water, but once hot, water inside the water heater will stay hot for many hours. Another energy saving hint is to turn your electric hot water heater off when you are travelling.




**Electric water heater blanket. Photo from www.energysavers.gov**

Water heater blankets are another way to make your electric water heater more efficient. Your water heater won't have to work as hard if it is wrapped in a layer of insulation. Water heater blankets are available commercially from home stores or online and are intended to be installed on electric water heaters. (They can be dangerous if improperly installed on other types of water heaters.)

When it is time to replace your water heater, consider a more efficient model. Not all water heaters are created equal. Research your options carefully and look for the ENERGY STAR logo. Speak with a professional to decide what kind of water heater will best meet the specific needs of your household. Many households in Alaska have made the switch to tankless water heaters. Tankless, or "on-demand," water heaters save energy by heating water as you need it instead of keeping water hot all the time. When a hot water tap is turned on, water is rapidly heated by the heating element, which stays on until the water stops flowing. Switching to a tankless system can be an expensive upgrade, and installation is generally more complicated than for an electric

water heater, but they are a great solution for many homes. Tankless water heaters are usually run by propane, natural gas or fuel oil.

Finally, remember that one of the simplest ways to save on water heating is to use less hot water. Consider low-flow shower heads and other water conservation strategies to limit the amount of hot water used in your home. The less you use, the less you have to heat.

## Dryers and Space Heaters

Electric dryers and space heaters are two examples of electric appliances that can greatly impact residential electric bills. Electric heating appliances are extremely power-hungry devices. They turn electricity to heat by feeding electric current through a large, resistive heating element; in general, this is not a very efficient way to produce heat.

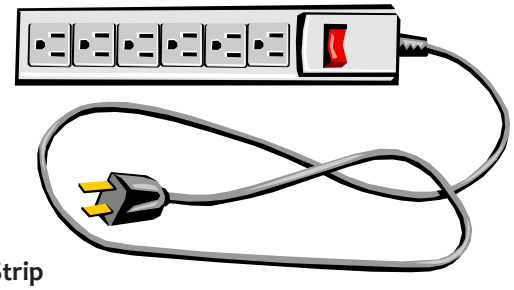
**Electric clothes dryers** use a great deal of electricity. While using an outdoor clothesline is a great way to avoid the electricity costs, it is not a convenient solution in Alaska for much of the year. Here are a few simple tips to efficiently use an electric dryer:

- Clean out lint buildup regularly. Lint in the filter and vent pipe can result in slower drying and greater electricity use.
- Don't run your dryer longer than you need to. Many people tend to turn the timer to the maximum time. If the dryer isn't equipped with a moisture sensor, consider experimenting to find out how much drying time your clothes actually need. Try setting your dryer at 30 minutes and then checking to see if the laundry is still damp. If so, give it a little more time.
- When it is time to purchase a new dryer, remember that not all dryers are created equal. Compare the energy efficiency of different dryers and the look for the ENERGY STAR logo.
- While we're in the laundry room — modern, front-load washing machines not only require less water than top-loaders, they spin your clothes very fast, which means your laundry is less wet when it goes into the dryer. This saves money on washing and drying.

**Electric space heaters** used for prolonged periods or as a primary heating source can be very expensive, depending on the electric rates in your region. Because the price of electricity varies greatly throughout the state, it's important to know what the best heating options are in your community.

In communities where most heating is done with fuel oil or natural gas, electric heaters might still have a place. Used sparingly, electric space heaters can be an economical option because they allow you to keep individual rooms warmer than the rest of the house. For example, some people like to keep the bathroom warmer when they shower, and they use an electric space heater for this. However, in most of Alaska electric space heaters used as a primary heat source or for prolonged periods are almost always more expensive than other heat sources, such as boilers.

**An electric space heater uses about the same amount of electricity as 10 60-inch LCD televisions.**



**Power Strip**

While there are different kinds of electric space heaters (e.g., ceramic, oil-filled and infrared), they all function on the same basic principle of resistive heating. The main difference between different types of plug-in heaters is how the heat "feels," but this doesn't change the amount of electricity the device uses when it's plugged in. While some heaters claim to be energy efficient, the numbers don't lie. Check the label on the back; it will tell you how much electricity it uses. Fifteen hundred watts, or 1.5 kW, is pretty typical. That's more than enough juice to power 10 giant, 60-inch, LCD televisions.[3]

Remember, regardless of your heating method, lowering heating demand is the most effective means of reducing your heating needs. This could mean improving insulation, sealing drafts or turning down the thermostat. If you're finding that you need to rely on electric space heaters to keep parts of your home comfortable, it may be time to address some larger issues with your home's heating system.

As a general note, anything that gets warm when you turn it on is an example of resistive heating. Some appliances do this intentionally (e.g., stove tops); others do this as an unintended side effect (e.g., computers and lightbulbs). Either way, this process uses a great deal of electricity to produce heat. Finding "hot spots" among your electrical appliances is one way to reduce consumption.

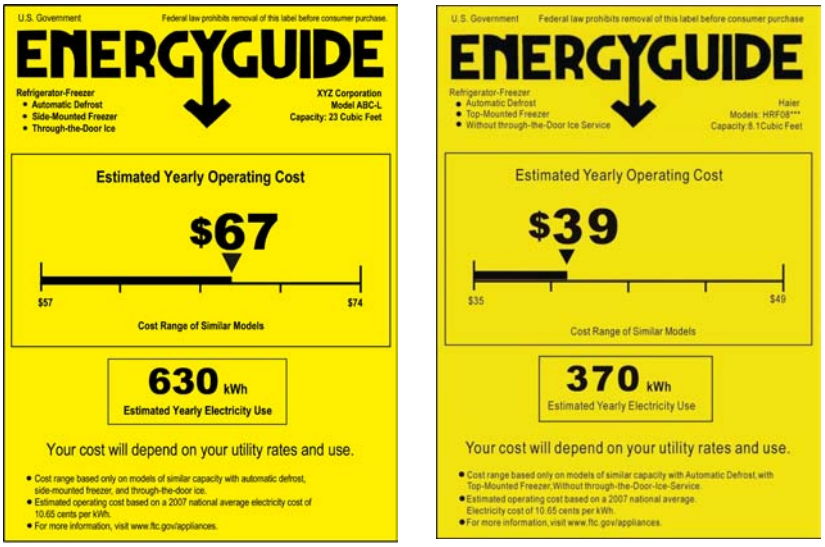
## Phantom Power

"Phantom power," also called "standby power" or more ominously, "vampire power," is electricity that is used by an appliance while it is turned off. While this seems counterintuitive, many devices continue to draw power even when they are off.

Televisions, cable boxes, stereos, DVD players and video game consoles are some examples of electric appliances that use phantom power. As a general rule, any appliance that has a clock or turns on with a remote control uses some phantom power. While this might only be a small amount of electricity, the typical household has many appliances slowly slurping down electricity 24 hours a day. The costs add up to almost 10 percent of residential electricity use.[4]

Consider this: Over the life of a typical DVD player, more electricity will be used to power the clock in "standby" mode than is actually used to play DVDs. Depending on usage patterns in your home, this is likely also true for many more appliances, such as game consoles, microwaves and cable boxes.

Unplugging appliances when you are not using them allows you to prevent the slow drain of phantom power. Using a power strip is more convenient than unplugging appliances. Power strips (sometimes called "surge protectors") can be conveniently located and will disconnect appliances from the electrical circuit in your home to eliminate phantom power. When you switch off a power strip, you can "unplug" several appliances at once. An entertainment center is a great spot to use a power strip since televisions, cable boxes, DVD players, stereo systems and video game consoles are notorious users of phantom power.




**By comparing the EnergyGuide label from two refrigerators, it's easy to see that one uses much less electricity than the other. The estimated yearly operating cost (the top number) is based on an national average electricity cost. Since many Alaska communities pay higher rates for electricity, it costs more to operate these appliances. To get an idea of how much it will cost to run an appliance in your area, multiply the estimated yearly electrical use (the bottom number) by the electrical rate in your community. This can be found on your electric bill. For example, if electricity costs $0.20 per kWh in your community, the refrigerator on the left will cost $126 per year to operate ($0.20 x 630 kWh) and the one on the right will cost $74 to operate ($0.20 x kWh). Quite a difference!**

New products such as "smart" power strips make it easier than ever to combat phantom power. They have circuitry that will automatically cut power to appliances that are not being used. Remember, phantom power is electricity you are paying for when you're NOT using your appliances. This makes it one of the easiest targets for most families trying to save money on electricity.

## Large Appliances

Large appliances such as refrigerators, washing machines, dishwashers, dryers and freezers tend to be major sources of electric use in most households. These large "whiteware" appliances support quality of life in the home. It is, therefore, difficult for many families to limit their use. In some cases, however, an extra freezer or refrigerator could be eliminated entirely. If you operate more than one refrigerator or freezer, take an inventory of what is inside and consider if your family could do without it at least part of the year. For many families, an extra freezer becomes an unopened tomb for years-old food.

Another important consideration with large appliances is their age. Over the last decade, large appliances have improved dramatically in regard to energy efficiency. It may be time to replace that old washer or refrigerator with a newer, more efficient model.

When purchasing a new large appliance, you'll have to weigh many factors such as price and personal preference. From the perspective of electricity consumption, the most important information will be printed on a large yellow sticker attached to the appliance at the time of sale. This "EnergyGuide" sticker gives details about the appliance and gives estimates of electrical use based on U.S. government standard tests. This sticker also gives an estimate, in dollars per year, of how much it costs to operate the appliance. It's important to understand that this estimate is based on a typical usage for a home paying the average U.S. electricity rate. Because of varying appliance use patterns and the fact the electricity is more expensive in most parts of Alaska than in the rest of the United States, this dollar amount is not accurate for most households in the state. But, because the sticker is based on standard tests, it is very useful for comparing similar appliances. Use this EnergyGuide sticker whenever you are shopping for new appliances to make informed decisions.

When shopping for large appliances, you may also see an ENERGY STAR label on some appliances. The U.S. government offers this label to appliances meeting set criteria for energy efficiency. Due to our high electricity prices, many Alaskans will *only* consider ENERGY STAR labeled products when shopping for new appliances. While the ENERGY STAR label has done much to promote the sale of

efficient products, it doesn't tell the whole story. Check the EnergyGuide sticker to get a more detailed picture of the electrical needs of an appliance.

Last, freezers and refrigerators use electricity to remove heat from inside and transfer it to the coils at the back of the appliance. For this reason, freezers and refrigerators can cool more efficiently if they are placed in the cooler parts of the home. Many Alaskans choose to put freezers outside in the winter to save on electricity costs. Unfortunately, many modern freezers are not designed to be run in ambient temperatures below 50°F. This can damage them. Check with the manufacturer for more information about specific models.

## Small Appliances

Smaller appliances use less electricity than the large appliances, however, most homes use a greater number of small appliances. Now is the time to perform a walk-through of your home. Examine every electrical outlet and what's plugged into it. Ask yourself if this device could be unplugged. Consider if it is using "phantom power" even when it is turned off. Also, consider if this device could be put on a timer, motion sensor or power strip.

Many homes have a computer. Here are some things to remember: Turning your computer off when it's not in use is the best way to save electricity, but setting your computer to go into "sleep" or "hibernate" mode automatically after a few minutes of inactivity can help reduce energy use. Remember that monitors use power too, so make sure the monitor is off when you are not using your computer. Computer "screensavers" are a notorious waste of electricity. Generally speaking, laptops use much less power than desktop computers. For this reason, many electricity conscious consumers will opt for a laptop instead of a desktop computer.

## Tools and Devices

While the greatest opportunities for saving electricity can be identified simply by careful consideration and common sense, there are a few tools and devices which can help families to save money.

**Power strips:** Sometimes called "surge protectors," these devices are an inexpensive way to avoid phantom power and to "unplug" several appliances at once. Home stores offer a wide variety of power strips and many new models are available with added features. Some models will switch off automatically; others have remote controls so you can switch off power strips in hard-to-reach places with ease.


**Electricity usage meters:** These devices are widely available online and at home stores and are even offered through some electrical utility companies. They plug in between the wall outlet and the appliance and tell you how much electricity is being used. This is useful for measuring phantom power and for assessing how much electricity our favorite appliances draw. Many models can be programmed to give both real-time usage and a record of usage over a period of time. Many can also be programmed to calculate the cost of the electricity you are using. This can be useful in explaining conservation strategies to family members.

Power usage meter

**Timers and motion sensors:** Replacing a traditional wall switch with a timer or motion sensor can help many families conserve electricity. It s a relatively simple project and is perfect for interior lighting and bathroom fans. Outdoor motion sensors are great for porch lighting and security lights. Outdoor timer switches work well for engine block heaters and other outdoor appliances. Thermostatically controlled outlet switches are also great for heat tape, engine block heaters and freeze protection. They allow a heating element to turn on automatically when the temperature drops.


A traditional wall switch can be replaced with a timer (left) or motion sensor (right) to save electricity.


Outdoor timer switches work well for engine blocks and outdoor appliances.

Motion sensors are useful for porch lighting and security lights.


Thermostatically controlled outlet switches allow a heating element to turn on automatically when the temperature drops.

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1 U.S. Department of Energy, "Household electricity report." www.eia.doe.gov/emeu/reps/enduse/er01_us.html

2 U.S. Department of Energy, "Energy Savers." www.energysavers.gov/your_home/water_heating/index.cfm/mytopic=12760

3 From Sony website. 60" BRAVIA NX720 Series HDTV. Energy Consumption 94W (energy Star mode) – 182W (max). www.sonystyle.com/webapp/wcs/stores/servlet/ProductDisplay?catalogId=10551&storeId=10151&langId=-1&productId=8198552921666327041#specifications

4 Lawrence Berkeley National Lab. http://standby.lbl.gov/

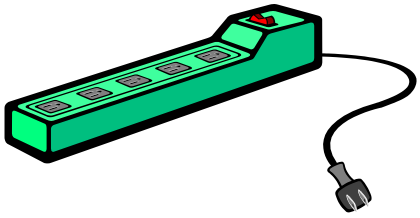
# Home Electricity Audit: A Checklist

## Lighting

- ☐ Turn off unused lights.
- ☐ Use motion sensors or timers to turn off lights where appropriate.
- ☐ Make sure lighting intensity is appropriate for each room/task.
- ☐ Maximize natural lighting (windows).
- ☐ Replace incandescent bulbs with compact fluorescent bulbs.

## Electric water heater

- ☐ Set temperature appropriately for household needs.
- ☐ Put water heater on a timer, if appropriate.
- ☐ Install low-flow or water-saver shower heads.
- ☐ Turn off water heater when house is vacant.



## Electric clothes dryer

- ☐ Clean out lint.
- ☐ Run only until clothes are dry, not longer.
- ☐ Consider replacing with a more efficient model.

## Electric space heaters

- ☐ Use sparingly for specific tasks.

## Phantom power:

- ☐ Unplug appliances such as TVs, DVD players and game consoles when not in use.
- ☐ Purchase power strips to turn off many appliances at once.
- ☐ Consider outlet timers or thermostatic controls for outdoor applications.

## Large appliances (washer, refrigerator, freezer, dishwasher, etc.)

- ☐ Eliminate unnecessary extra freezers or refrigerators.
- ☐ Upgrade old appliances to new, ENERGY STAR appliances.

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